

QUANTIFICATION OF GAS, ODOR AND DUST EMISSIONS FROM SWINE WEAN-FINISH FACILITIES

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GOALS OF THE PROJECT

- Determine the amount of gases, odors and dust emitted from buildings when swine are fed different diets and manure storage times; test and validate models of lean growth of pigs to predict the nutrient outputs with different diets.
- Effectively implement the adoption of new diet modification technology to control manure nutrients and odor emissions on 20% of the pork production operations in the US.
- Test an economic model for producers to evaluate cost effective and environmentally sound feed management and nutrition alternatives; use the economic model on swine farms as a decision-making tool to maintain sustainability for all sizes of pork production operations.
- Provide the information for scientific guidelines and a basis to develop legislation and regulations for a compatible environmental policy for the future of animal agriculture.

Objectives

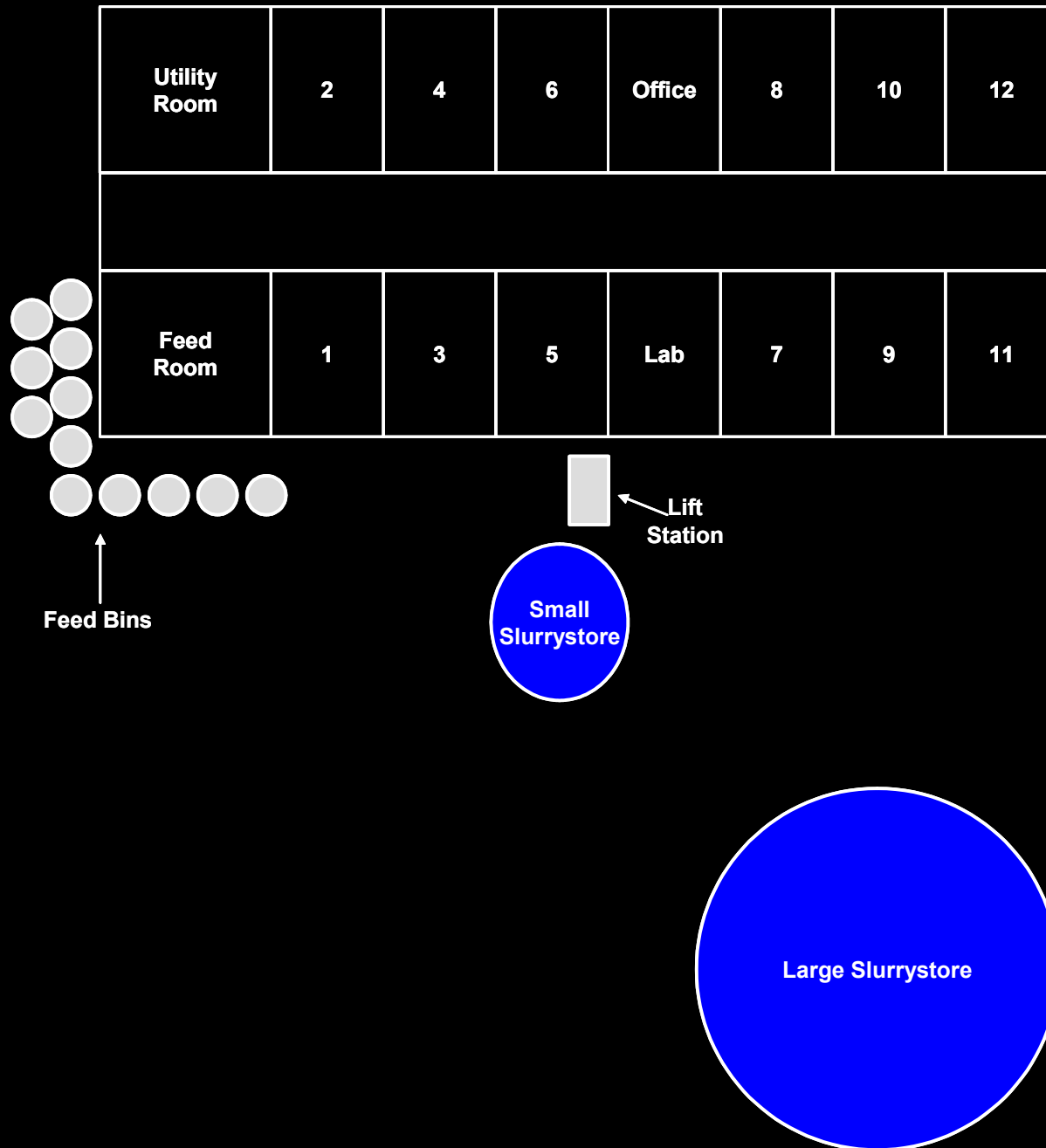
- Establish baseline gas, dust and odor emissions from group-fed pigs housed in environmentally controlled facilities at different stages of growth and at different seasons of the year.
- Conduct nutrition studies to determine the value of new diets formulated with highly available mineral sources (especially sulfur), enzymes, and protein availability and amino acid manipulation, and their effects on excretion of odorous compounds or precursors of odorous compounds in manure, gas emissions and dust in group-fed pig housing facilities.
- Determine the effect of manure storage time within a housing facility on gas, odor and dust emissions from group-fed pigs.
- Develop prediction models and a preliminary economic analysis of diet manipulation and manure storage times on nutrient excretion, air quality, pig lean growth, and pork production economic stability and profitability.

Experimental Design

- 2 x 2 factorial design
 - LNE vs. Control
 - Pull plug vs. deep pit
- Staggered load to minimize season effects
- Biweekly weights
- Monthly manure analysis
- Monthly CEM

Swine Environmental Research Facility







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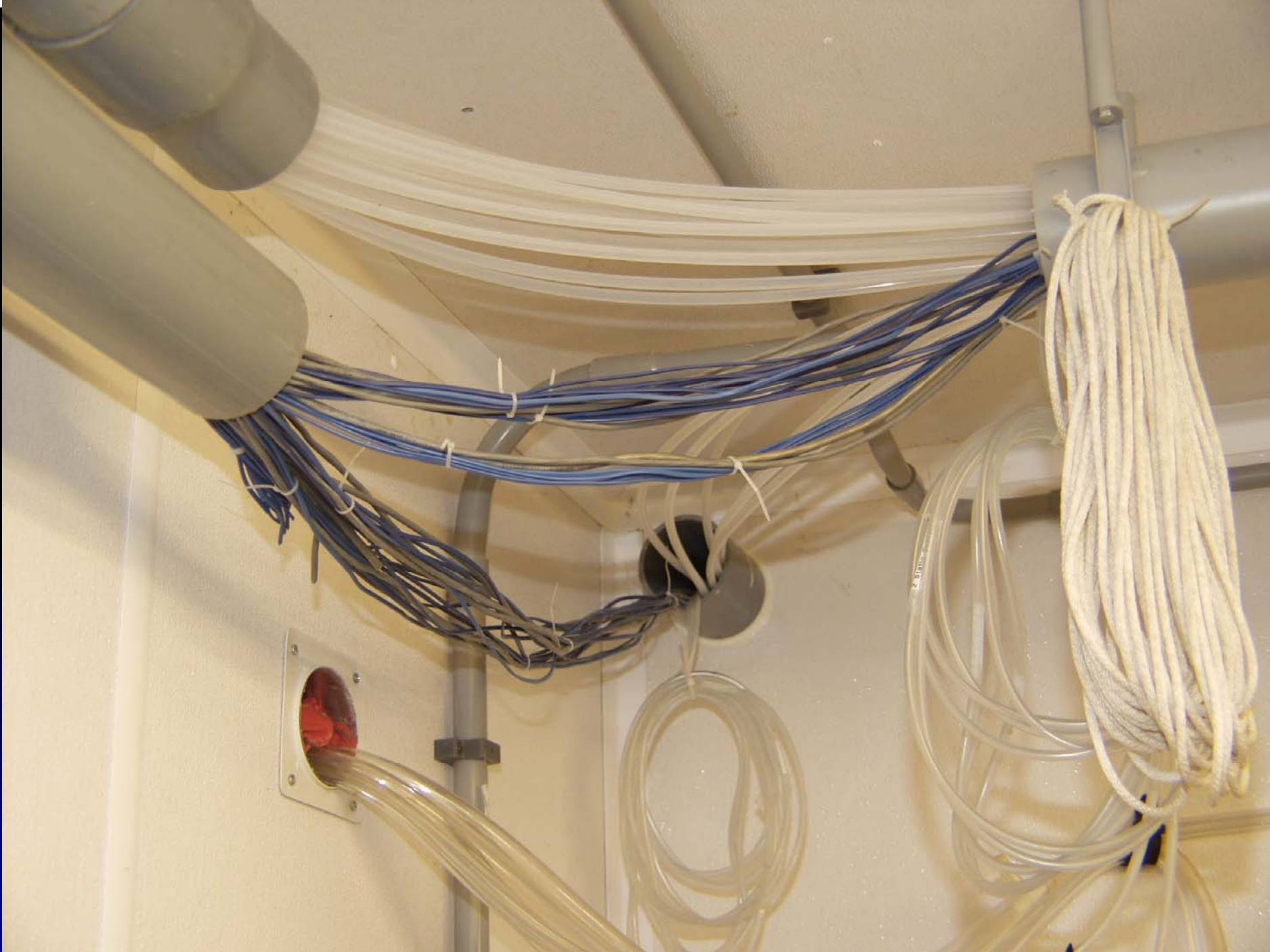














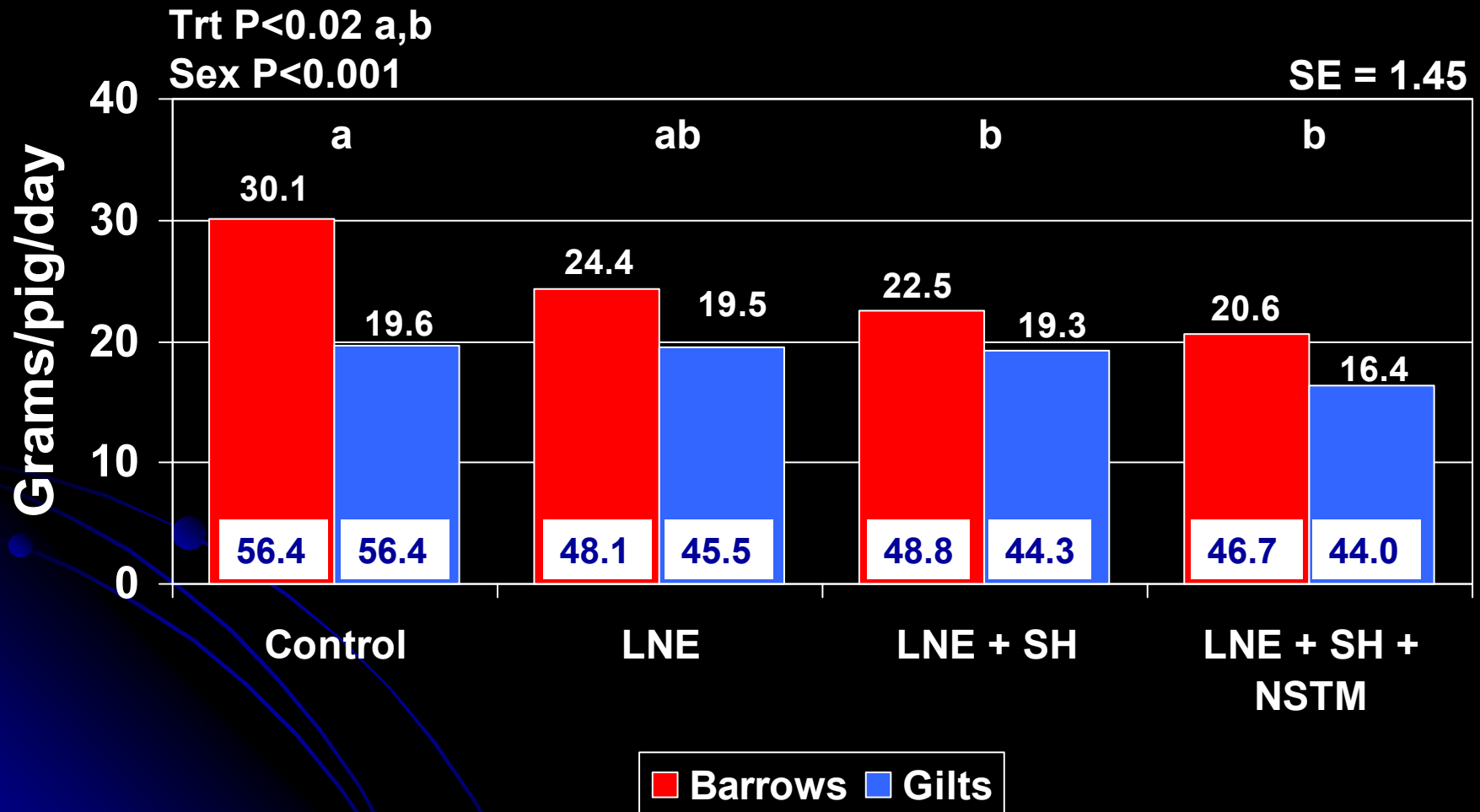
J. S. Radcliffe, May 12, 2005



Preliminary Data

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Total N Excretion (wk 0-12)



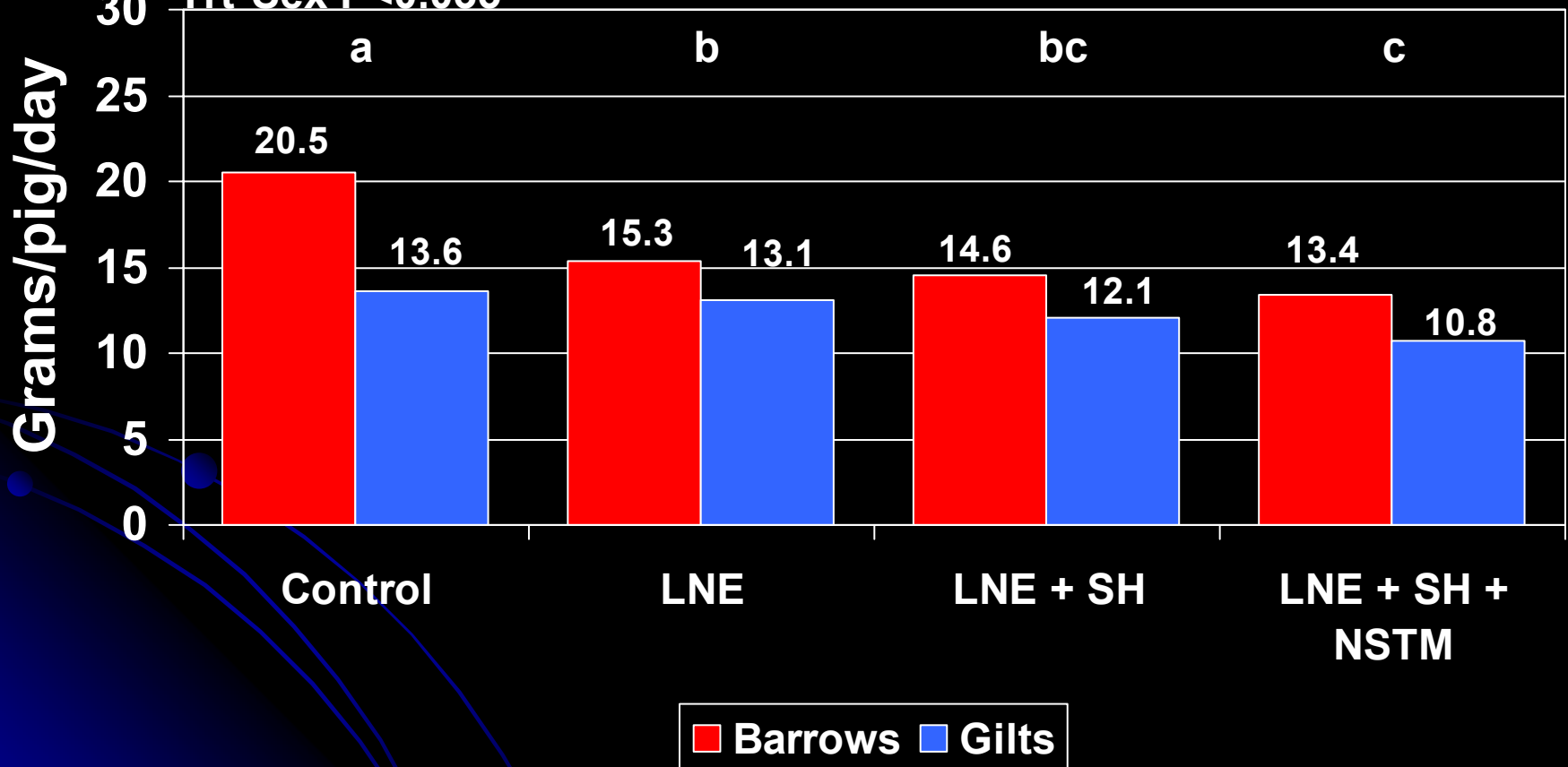
Ammonium Excretion (wk 0-12)

Trt $P < 0.001$ a,b,c

Sex $P < 0.001$

Trt*Sex $P < 0.035$

SE = 0.70



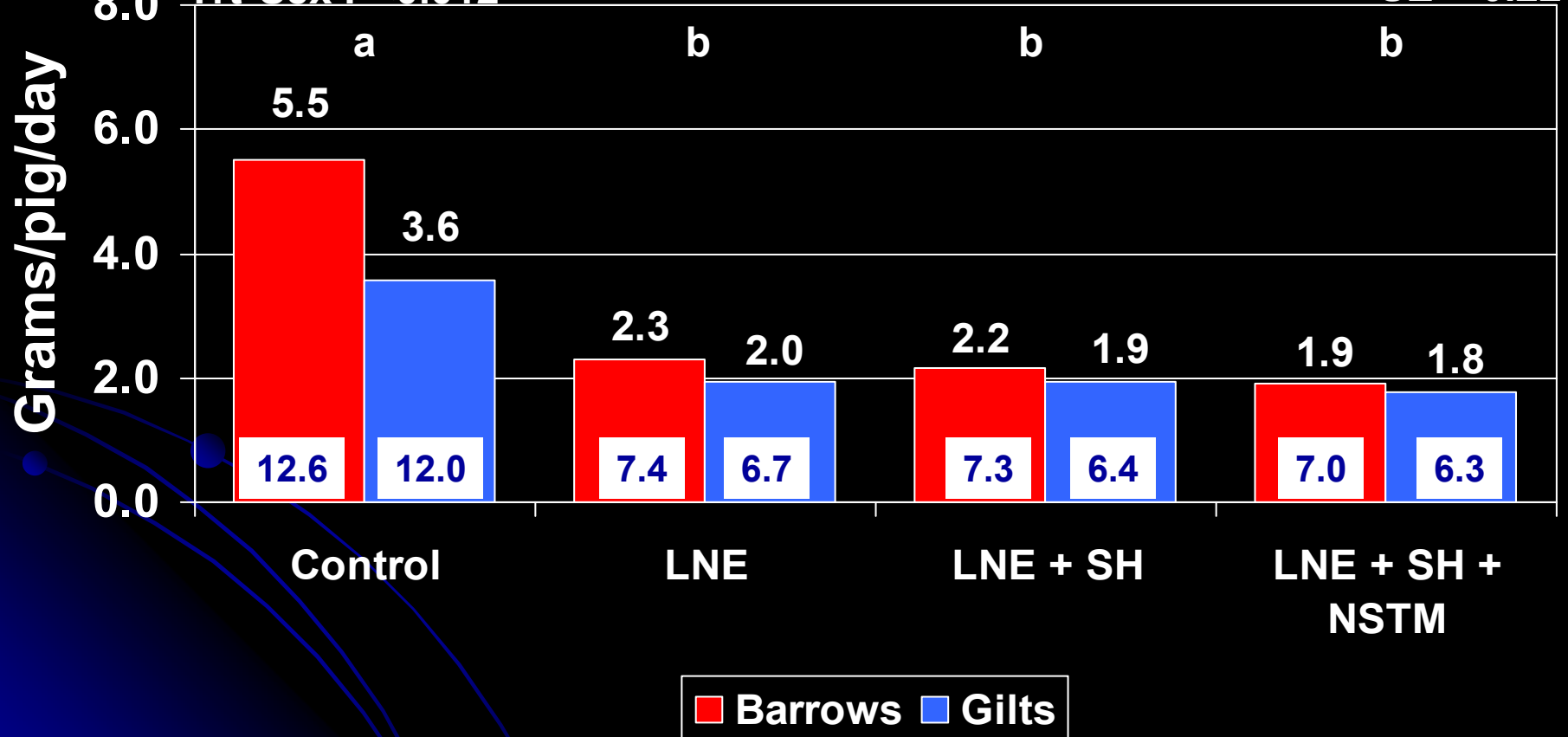
Phosphorus Excretion (wk 0-12)

Trt $P < 0.001$ a,b

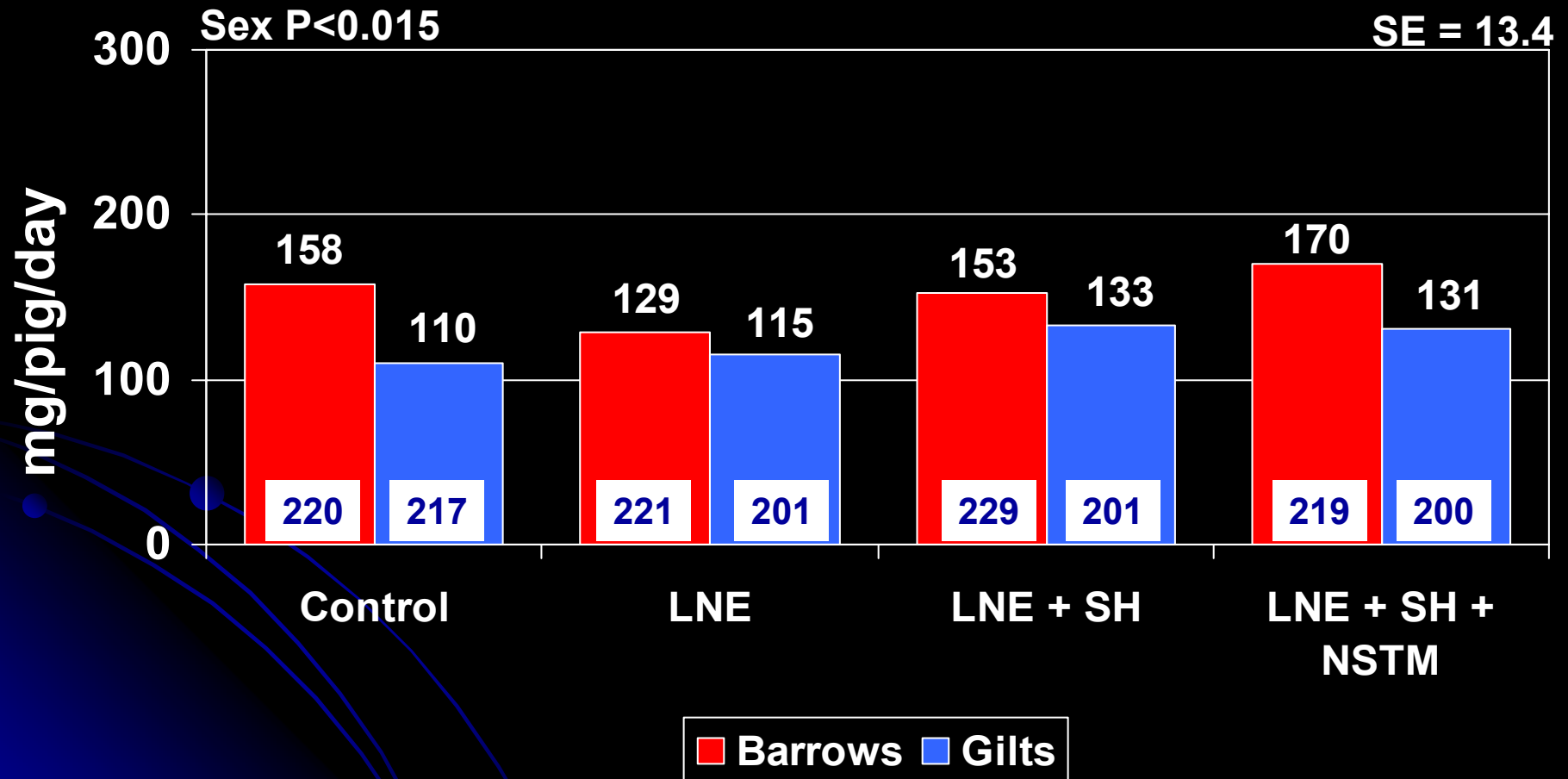
Sex $P < 0.003$

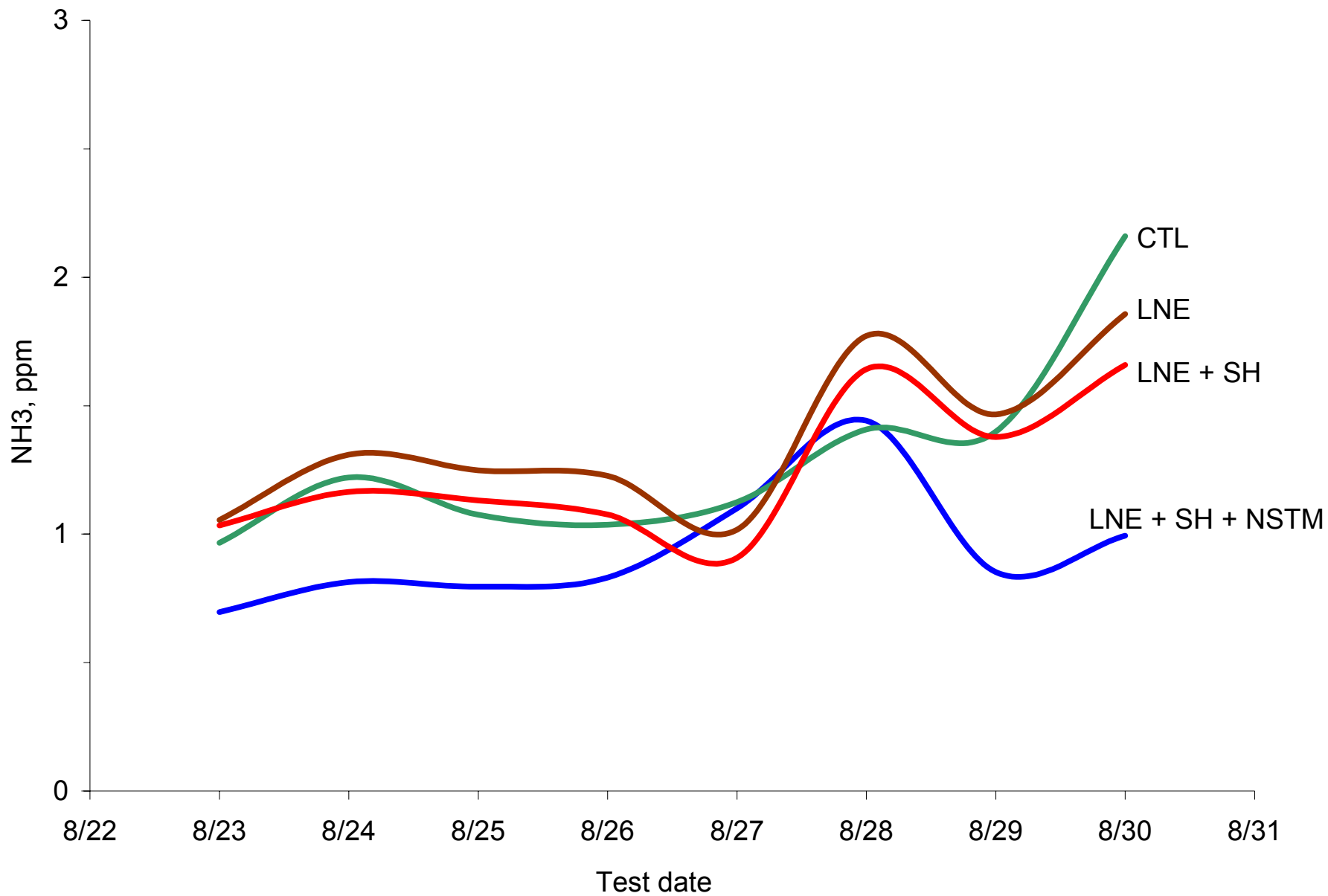
Trt*Sex $P < 0.012$

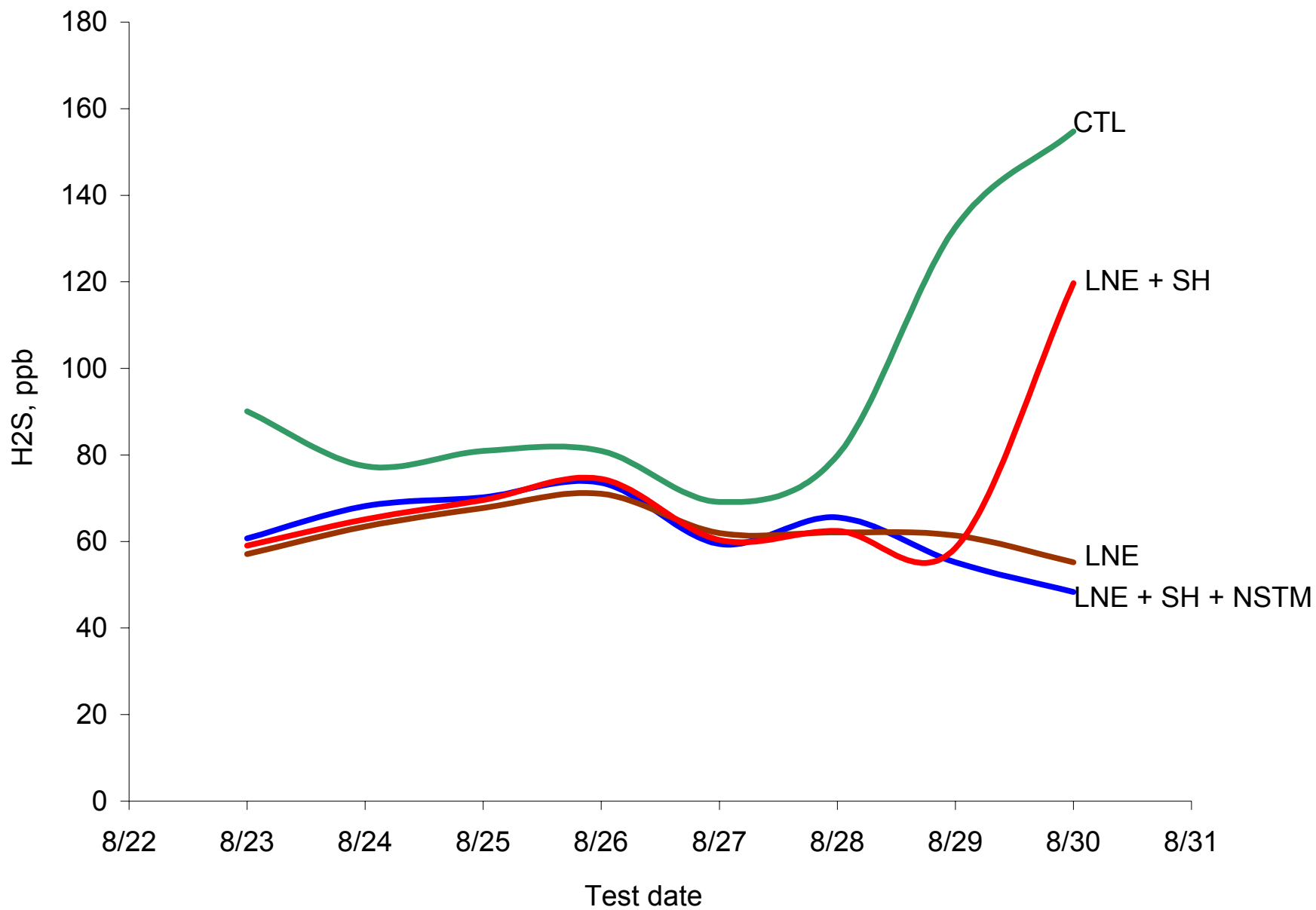
SE = 0.22

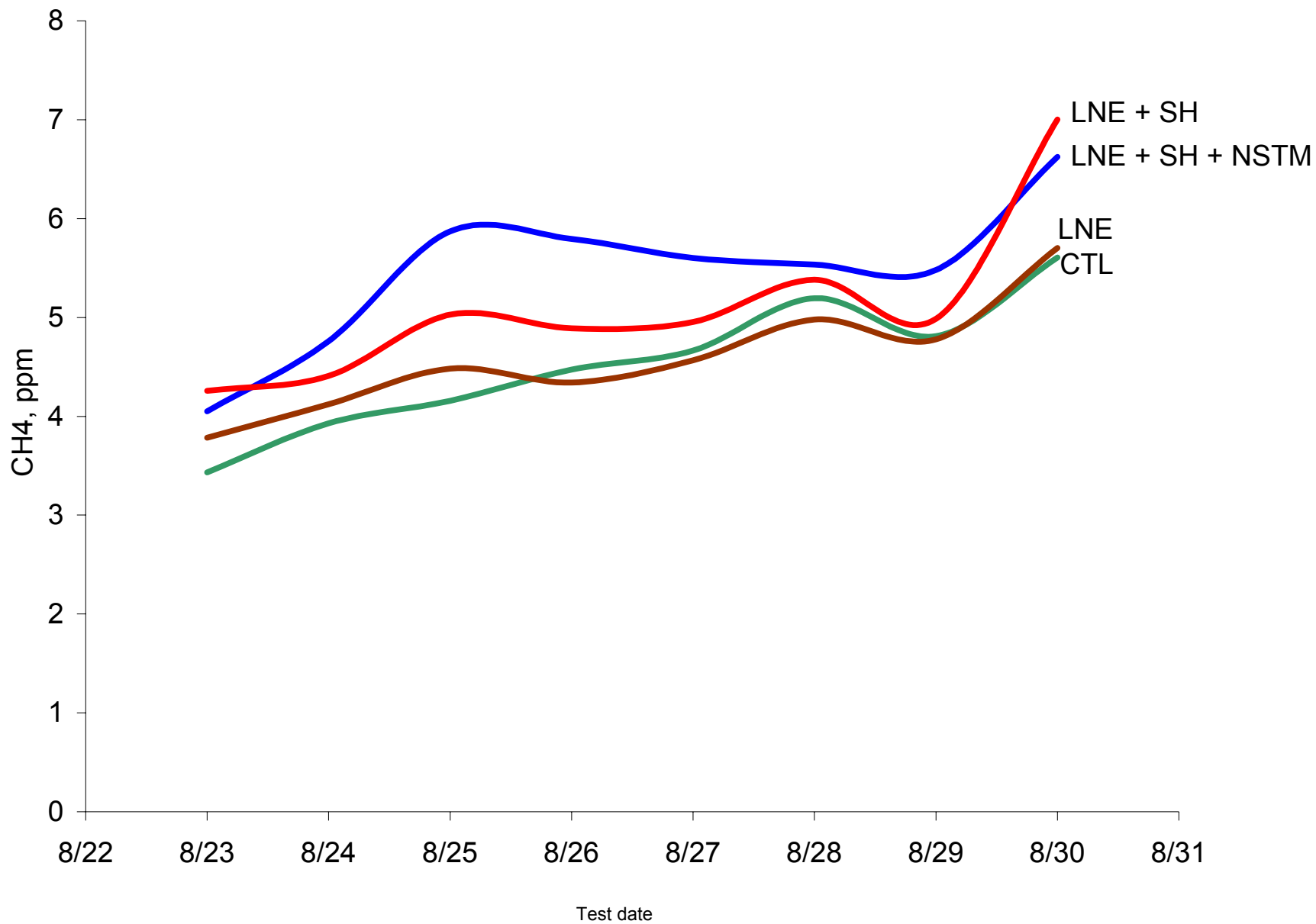


Zinc Excretion (wk 0-12)









Sample Collection Method

J. S. Radcliffe, May 12, 2005









